

WASTEWATER TREATMENT DIVISION CAPITAL IMPROVEMENT PROGRAM

Introduction to Program, Goals, and Highlights

The Wastewater Treatment Division's (WTD) Capital Improvement Program (CIP) budget request for 2007 is \$694 million. The total 2007-2012 proposed budget plan is approximately \$1.4 billion.

The mission of the WTD is to protect public health and enhance the environment by treating and reclaiming the region's wastewater, recycling solids and generating energy. Since 1958, when King County citizens voted to build a regional wastewater system to clean the polluted waters of Lake Washington and Puget Sound, we have helped to dramatically improve water quality while recycling and reusing natural resources.

The objectives of the capital program are to:

- ensure continued operation and reliability of existing wastewater conveyance and treatment assets;
- enhance regional water quality in compliance with federal, state and local regulations; and
- ensure sufficient capacity to meet the long-term needs of the regional service area.

Attaining these objectives is the basis for the projects included in the 2007 CIP budget.

In June 2001, the Metropolitan King County Council passed the Wastewater Flexible Budgeting Ordinance (King County Code, Chapter 4.04) creating a budgeting process for the WTD CIP. This comprehensive ordinance defines a process that allows the WTD the flexibility needed to achieve its mission and provides accountability for the spending.

In accordance with the flexible budgeting ordinance, the spending authority for most capital projects is appropriated at the fund level. The projects included in the 6 minor asset management categories are appropriated at the category level. This allows WTD the flexibility to transfer funds among projects within the appropriation category, subject to reporting requirements, and to react to special circumstances as they occur. In each case, only one year of budget authority is appropriated. Additionally, the full term of multi-year construction contracts is appropriated in the first year of the contract. Inclusion of the full contract value in one year can give rise to fluctuations in appropriation requests over time. For example, a large multi-year contract will increase the appropriation in the first year relative to the subsequent years.

**Wastewater Treatment Division
2007 Proposed Appropriation**

	Proposed Appropriation
WTD Capital Projects	681,542,312
Minor Asset Management Categories	
Structure and Site Improvements	3,465,679
Mechanical Equipment	2,086,119
Odor and Corrosion	14,856
Pipeline Replacement	1,780,305
Process Replacement/Improvement	2,629,036
Electrical, Instrumentation and Control	2,057,886
Total	693,576,193

Financial Planning and Policy Overview

In June 2006, the Metropolitan King County Council adopted a monthly wholesale sewer rate of \$27.95 for 2007. A capacity charge of \$42.00 will also be in effect in 2007. Revenues generated by the rate and capacity charge are sufficient to fund the accompanying appropriation request while fully complying with WTD's financial policies. The WTD CIP is funded primarily through proceeds from revenue bond sales, short-term borrowing, capacity charge revenues, and transfers from the operating fund. The operating fund derives the majority of its revenue from monthly charges to sewer customers that are collected by WTD's component agencies. Transfers from the operating fund to the capital program are the result of the financial policy requirement of maintaining a debt service coverage ratio of no less than 1.15 of all debt service payments. WTD uses these transfers to reduce the amount of borrowing necessary to finance the capital program.

The capacity charge is based on the capacity charge methodology the Metropolitan King County Council adopted in October 2001 in Ordinance 14129. The methodology provides an equitable basis for allocating the costs of the wastewater treatment system to the customers that use it. Specifically, it enacts the Regional Wastewater Services Plan (RWSP) policy of growth paying for growth by ensuring new customers pay their equitable share of the cost of building new capacity in the system.

Capital Project Budget Estimates

WTD uses a consistent and systematic approach across the division to develop initial project budgets and update existing budgets. The following section provides an overview of the project budgeting process, including assumptions for contingency and inflation.

The initial project budget is almost always derived from a planning-level budget estimate.

These estimates are prepared early in the life of the project and provide the expected capital construction or implementation costs. These estimates are based on:

- 1) the project scope as it is known at that time;
- 2) industry standard pricing and contingencies;
- 3) historical project comparisons;
- 4) in-house and/or consultant experience; and
- 5) benchmarking, estimating programs, and in-house construction cost models.

The capital implementation cost estimate is used to derive additional project costs, including planning, engineering, construction, right-of-way/land acquisition costs, staff labor and overhead costs. Using extensive historical information and management input, the parameters and standards used in allocating these additional costs vary according to such things as: (1) the size and complexity of a project, (2) whether engineering is performed by County staff or consultants, and (3) whether construction management is performed by County staff or consultants.

The result is an overall project budget including details on schedule, construction costs, engineering costs, staff costs, overhead costs and right-of-way/land acquisition costs. This budgeting model produces detailed cash flow information by year and project phase in addition to detailed staffing information by phase and cost center or year and cost center. WTD will continue to improve the model over time.

Program Contingency

Program contingency provides an element of flexibility in reacting to changing circumstances across the entire CIP program. For the WTD CIP program, contingency is defined as 7.5 percent of the appropriation-year cash flow or \$10,000,000, which ever is less. Program contingency is identified as a single project (423545) and can be found under Central Functions.

Project Contingency Assumptions

Project contingency is added to a project to explicitly reflect the uncertainty about the future and as a buffer against the risk of under-funding a project. In WTD, CIP project contingency is calculated using standards recommended by the Association for Advancement of Cost Engineering (AACE) recommendations. The typical WTD CIP project goes through five phases; with each successive phase representing more complete and detailed project information. The five phases include planning, pre-design, design, construction, and closeout.

In the calculation of project contingency, the percentage of total project cost is specified according to the current phase of the project. The following table shows the percentage associated with the current phase of the project.

Project Phase	Percent Contingency
Planning	30
Predesign	20
Design	15
Construction	10
Close-out	0

The contingency is based on total project cost and entered in the close-out phase of the project. As the project moves through the phases, the contingency amount will decrease, reflecting the improvements in project definition and expected accuracy of the data.

Inflation Assumptions

Inflation is a market-driven increase in the level of prices over time that results in the future decrease in purchasing power of today's dollars. The WTD CIP contains many multi-year projects in which price changes over time affect the cost of materials and services.

There are many sources of inflation, and prices do not always change at the same rate. For example, the cost of construction materials and commodities have increased at a greater rate and shown more volatility during the last several years than general inflation. This reflects a strong local construction market and national and international economic conditions. For the WTD CIP, the cost of construction and materials is of important as it can be a significant portion of a project's budget. In 2004 increases in the prices of construction materials reached record levels. While there was some moderation of year over year increases during 2005 the rate of change has remained historically high. Additionally, construction costs for non-residential, heavy construction projects has increased more than other construction activity in 2006.

Between 1985 and 2005 the average annual change in the Consumer Price Index and the construction cost index is 3 percent per year. WTD assumes general prices increase at 3 percent per year during the 2007-2012 budget period. This does not reflect a projection of any single inflation index but reflects a reasonable aggregate rate of increase for the next 6 years, based on the historical activity of both construction and non-construction price indices. Indices tracked include the Consumer Price Index, Implicit Price Deflator, the ENR Construction Cost Index, and the ENR Building Cost Index.

It should be noted that while a standard increase of 3 percent per year is being used in estimating costs for its wastewater projects, the activity in project components such as materials, labor, equipment, supplies, and contractor markups may require an increase in inflation assumptions in subsequent budgets. The activity in the construction market during the last two years clearly indicate the need to carefully monitor and analyze inflation assumptions.

Project Prioritization Methodology

In 2003, King County's Wastewater Treatment Division initiated a new process to prioritize its capital projects for funding. This process combined WTD's former approach with the

approaches used by other large West Coast wastewater utilities. In summary, the new process evaluates each capital project against specific criteria that reflect WTD's mission and goals. Each project receives a score based on this evaluation, and the result was a numeric ranking of projects from 1 to N. This ranking, combined with the project cost estimates and other information, helps WTD managers identify which projects to fund in the budget. The process assumes that each proposed capital project is part of an approved comprehensive plan or has a sound business case, as demonstrated in a detailed project review form.

The prioritization system groups capital projects in three project categories, each with a set of criteria based on the division's mission statement.

1. **Major Capital** - projects that provide new capacity to the wastewater systems or add additional capacity to the system. Five categories of criteria are proposed for projects in the Major Capital projects in this category: (1) Regional Capacity Needs, (2) Public Health, Safety, and Property, (3) Regulatory or Contractual Requirements, (4) Natural Resources Protection, and (5) Cost Savings.
2. **Asset Management** - projects that rehabilitate or improve existing facilities, upgrade technologies, and improve processes or systems. Asset management projects typically do not increase capacity. Five categories are used to score Asset Management projects: (1) Service Disruption and Impacts from Asset Failure, (2) Employee Safety, (3) Regulatory or Contractual Requirements, (4) Remaining Equipment Life/Asset Damage, and (5) Cost Savings.
3. **Planning** - projects that are more diverse in nature, such as planning work, studies, central administrative functions, and projects supporting the Water and Land Resources Division. Six categories are used to score Planning projects: (1) Regional Service Needs, (2) Public Health Protection, (3) Regulatory Compliance (4) Contractual Requirements or Mandates, (5) Natural Resources and Property Protection, and (6) Cost Savings.

The result of the ranking process is three lists of ranked projects, one for each category of project. Each category has its own budget allocation, so only like projects compete against each other for available for funding.

To augment the prioritization process, WTD has compiled a set of guidelines for the consistent calculation of life-cycle costs and application of economic analyses to capital projects and alternatives. These analyses are an important element in defining projects from the Brightwater Treatment Plant to the combined sewer overflow (CSO) program update.

In addition, a major initiative encompassing a systematic and structured view of capital project decisions including economic analysis of project alternatives is under way in the asset management section. Business Case Evaluation (BCE) is a bottom up look at the capital project process that is providing the opportunity to work through a comprehensive framework that will form the basis of the program's capital decision making. Currently, case studies have been developed from which the lessons learned are being used to design and develop the form in which this process will be applied.

Project Categories

Capital projects carried out by WTD are grouped according to the major functions they serve in the wastewater system. There are thirteen functional categories in all. The spending authority for the first twelve of these categories is pooled at the fund level. For the thirteenth category, Minor Asset Management, the spending authority is defined at the level of the sub category.

1. South Treatment Plant
2. West Treatment Plant
3. Brightwater Treatment Plant
4. Local Treatment Facilities
5. Conveyance Pipelines and Storage
6. Conveyance Pump Stations
7. Combined Sewer Overflow (CSO) Control
8. Infiltration and Inflow (I/I) Control
9. Biosolids Recycling
10. Water Reuse
11. Environmental Lab
12. Central Functions
13. Minor Asset Management

2007 Significant Project Highlights

Brightwater Treatment Plant and Conveyance Systems: 2007 Requested Budget \$528,410,200

Construction began in May 2006 on both the North Mitigation Area and Site Preparation packages. Site Preparation will include site clearing and grading, capping of utilities, construction of temporary stormwater ponds and erosion control measures, and construction of the effluent drop structure. Excavation for deep structures and large scale earth moving will begin in 2007. Conveyance construction is on the critical path for completion of the Brightwater system in late 2010. All conveyance construction components are currently on schedule and no significant concerns exist at the present time.

Carnation Treatment Plant: 2007 Requested Budget \$2,717,036

Construction of the 0.40 mgd treatment facility that will serve the city of Carnation service area started in September 2006. This request is based on the most current information developed since the 2006 transfer of contingency funds. When completed, the facility will provide preliminary treatment (grit and screenings removal); biological nutrient removal; advanced treatment using a membrane bioreactor; ultraviolet disinfection; and a backup effluent discharge to the river. The companion Chinook Wetlands Enhancement project (2007-017) provides for the design and construction of a system to beneficially use the highly treated effluent and a pipeline to serve as primary discharge into the Chinook Bend Wetlands. These integrated projects, treatment plant and wetland discharge will provide regional benefits by demonstrating the advantages of using highly treated effluent to enhance the Snoqualmie watershed. The project is scheduled for completion in 2008.

Ballard Siphon Repair Project: 2007 Requested Budget \$6,056,000

In late 2005 inspections of the Ballard Siphon system indicated that the two 36-inch wood stave pipes were failing in several locations. The condition of the pipes was sufficiently poor that an Executive emergency waiver and declaration were approved to allow for the expedient preparation and replacement of the pipes. This request reflects more complete information and is in addition to the preliminary project budget established through a 2006 supplemental request. When completed, this project will design and build new inlet and outlet structures and new siphons across the Washington Ship Canal and provide the conveyance capacity to meet long-term flow requirements.

The replacement project is using rapid development techniques to streamline the engineering design process; permit acquisitions; and consultant, contractor, material and equipment procurement. The project will be completed within a total of 30 months, with just over 22 months remaining. To avoid the most significant environmental, engineering, permitting and schedule risks the design will use micro-tunneling to cross approximately thirty feet below the Ship Canal. The project is in final design and is on schedule to commence construction in July, 2007 and complete construction within the subsequent 12 months.

Hidden Lake Pump Station/Boeing Creek Trunk Project: 2007 Requested Budget \$2,559,549

This project will construct a new 5.5 MGD Hidden Lake Pump Station, a Boeing Creek Storage Facility of .5MG in-line pipe storage, and a new 12,000 ft Boeing Creek Trunk Sewer. Construction activity on the pipeline storage, pump station foundation and trunk sewer are progressing as scheduled.

The following table displays major projects in the 2007 Executive Proposed Budget.

Significant Projects		2007 Executive	Proposed Plan	Continuation
Wastewater Treatment Capital Improvement Plan		Proposed Budget	2007-2012	of Existing Project
423484	Brightwater Treatment Plant	\$423,499,463	\$467,435,911	X
423575	Brightwater Conveyance	\$104,910,737	\$255,313,725	X
423557	Carnation Treatment Plant	\$2,717,036	\$3,560,733	X
423602	Ballard Siphon Repair	\$6,056,000	\$6,056,000	X
423365	Hidden Lake PS/Boeing Creek Trunk	\$2,559,549	\$8,328,243	X

Project Subcategories

To help make it easier to track projects they are further grouped into four primary

subcategories: (1) asset management, (2) new facilities, (3) odor control, and (4) power management. Most wastewater capital projects fall under either asset management or new facilities, so the odor control and power management categories were added to logically differentiate the projects. Other subcategories are used, as well, to describe projects specific to two project categories: combined sewer overflows and minor asset management. Descriptions of those subcategories are provided under the related project category.

Asset Management

King County has many responsibilities as a regional wastewater service provider. It must protect the health and safety of the public and the environment, dependably collect and treat wastewater from 34 local sewer agencies, meet the terms of National Pollutant Discharge Elimination System (NPDES) permits, and protect the investment in its existing wastewater system. To fulfill these responsibilities and ensure the system has the flexibility to meet future demands, the County must maintain and periodically update its wastewater assets. In general, the asset management projects reported in this subcategory are part of the Facilities Inspection Program, which through routine inspections and refurbishment extends and optimizes the “useful life” of WTD assets, including facilities, structures, and pipelines. Accordingly, these projects vary widely in scope, ranging from replacing pavement to replacing the roofs on digesters.

New Facilities and Improvements

King County must provide the necessary wastewater capacity to serve the rapidly growing population in King County, south Snohomish County, and a small part of Pierce County. WTD forecasts predict that between 2000 and 2030 more than 1,000,000 new people will be living and working in WTD’s service area, generating an additional 63 million gallons of wastewater each day (mgd). The Washington State Growth Management Act requires the County to have infrastructure available to serve this growth, and the amendment to the Comprehensive Water Pollution Abatement Plan (the Regional Wastewater Services Plan) is the vehicle for meeting this requirement. The RWSP identifies wastewater capital projects to be constructed through 2030, including the new 36-mgd Brightwater Treatment Plant, a marine outfall, several large conveyance pipes, and 21 CSO projects.

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Odor Control

On July 14, 2003, the Metropolitan King County Council adopted ordinance 14712, which established odor control policies for the Wastewater Treatment Division plants and conveyance facilities. Pursuant to adoption of the ordinance, WTD has:

- Designed the first phase odor control improvements for the South Treatment Plant and the West Point Treatment Plant with construction completion anticipated in 2007 & 2006 respectively
- Tested new biological scrubbers for odor control
- Completed 90% Brightwater treatment plant and conveyance systems to meet ordinance-required control levels

- Maintained the WTD Odor Control Design Standard
- Included odor control in all major conveyance facilities upgrades

New odor control projects planned for 2007 include the design of replacement of the county's two Phoenix® odor control systems with superior bioscrubbers eliminating on-going media replacement costs and substantially decreasing maintenance requirements.

The Phoenix® odor control scrubbers use a thin layer of carbon media to convert hydrogen sulfide to elemental sulfur that must be water washed off the carbon surface. Automated washing cycles clean the sulfur from the carbon restoring much of the carbon's ability to remove additional hydrogen sulfide.

Power Management

There are two main types of power management projects. Projects of the first type implement Motion 11712, unanimously supported by the King County Council, to provide reliable power for safe and dependable wastewater treatment service.

The sewage backups and overflows that occurred during the widespread power outages caused by the Holiday Storm of 1996–97 and the Energy Crisis of 2000–2001 highlighted the need for onsite self-generation and standby generators at additional pump stations and treatment plants. Power supply is also made more reliable by upgrading existing equipment such as pump motors, switches, meters, and transformers.

The second type of projects conserve energy and provide long-term savings in energy costs. An example of this type of project is co-generation, where methane gas captured from the treatment process is used to power generators that provide electrical power that otherwise would have to be purchased.

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Green Building Initiative

WTD is supporting the King County Green Building Initiative. In this pursuit, WTD has initiated or completed the following actions:

- WTD staff serves on the King County Green Team.
- WTD has established an internal Green Team.
- Future revisions to the WTD CIP project management system will help with tracking green building implementation.
- An On-Call Green Building Consultant Contract is available for use by asset management and major capital project managers to help them implement the green building initiative in their projects.
- Continued funding of the Environmental Building Newsletter to help project managers implement the green building initiative in their projects.
- Revision of the WTD specifications to include green building language.
- Projects incorporating Green elements include the Brightwater Treatment Plant and Conveyance, Juanita Pump Station, Carnation Treatment Plant, West Point

Cogeneration, South Plant Cogeneration, Hidden Lake Pump Station, Pacific Pump Station, Sweyolocken Pump Station, Interbay Pump Station, and Soos Creek Pump Station.

Growth Management and Comprehensive Plan

Both King County and Washington State require sewer comprehensive plans for all entities that provide sewage collection and treatment. These plans must include specific information such as a capital facilities inventory, and must undergo a formal public review process. The Washington State Growth Management Act (GMA) further requires King County to forecast the amount of wastewater infrastructure necessary to serve growth within the urban growth boundary, and to have this infrastructure available when growth occurs.

The King County Council adopted the Regional Wastewater Services Plan (RWSP), a supplement to the King County Comprehensive Water and Pollution Abatement Plan, in November 1999. The RWSP is the policy basis for the capital improvements necessary to provide wastewater services to this region for the next 30 years.

The RWSP utilizes the same assumptions with regard to future population and employment levels in the Puget Sound region as does the GMA and the King County Comprehensive Plan. When originally presented to the Council for adoption, the RWSP included an up-to-date inventory of existing facilities, a level of service definition, and an identification of needs to support the regional vision adopted under the GMA and the King County Comprehensive Plan.

Council Adopted Budget

A20600 – Combined Sewer Overflow (CSO) Control – (\$12,000,000 2007 amount moved to 2008)

A20700 – Inflow and Infiltration – (\$12,500,000 2007 amount moved to 2008)

SECTION 121. WASTEWATER TREATMENT CAPITAL IMPROVEMENT **ERI EXPENDITURE RESTRICTION:**

Of the appropriation for CIP Project A20200, Brightwater Treatment Plan – New Facilities and Improvement, \$309,900 shall be expended solely for support of independent contract oversight on the Brightwater project to be provided by the auditor's office.

CIP Program Accomplishments and Completion Lists

Projects Completed in 2005

A20010 South Treatment Plant - Asset Mgmt

423538 South Plant Diffuser Replacement

A20110 West Treatment Plant - Asset Mgmt

423491 West Point Energy Improvements

423513 West Division Corrosion Repairs

423547 West Point Moore Controllers

A20120 West Treatment Plant - New Facilities & Improvements

423546 West Point Digester HVAC

A20130 West Treatment Plant – Odor Control

423324 WTP Process Cleaning w/Odor Control

A20420 Conveyance Pipelines and Storage - New Facilities & Improvements

423345 Wilburton Siphon Odor Control

423420 ESI Section 1 Capacity Restoration

A20620 Combined Sewer Overflow – New Facilities & Improvements

423003 Ravenna Creek Pipeline

423272 CP & S Swamp Creek Sewer Trunk

423441 Year 2005 CSO Update

A20650 Combined Sewer Overflow – Remediation

423056 NOAA Misc Outfall Sediment Remediation

A20920 Water Reuse – New Facilities

423528 Water Reuse Satellite Facility

A21010 Environmental Laboratory - Asset Mgmt

423570 Trace Metals ICP - MS

Projects to be Completed in 2006

A20010 South Treatment Plant - Asset Mgmt

423514 WTD Corrosion Prevention

423574 STP Alarm System Upgrade

A20040 South Treatment Plant - Power Mgmt

423408 Fuel Cell Demonstration Project

A20110 West Treatment Plant - Asset Mgmt

423417 Grit System Improvements

A20410 Conveyance Pipelines and Storage – Asset Mgmt

423588 Densmore Stormwater System Improvement Project

A20430 Conveyance Pipelines and Storage - Odor Control

423468 ESI Chemical Injection

A20510 Conveyance Pump Station - Asset Mgmt

423562 Mathews Park Pump Station Upgrade

423601 Barton Forcemain Repair

A20530 Conveyance Pump Station – Odor Control

423455 University Regulator Station Odor Control

A20540 Conveyance Pump Station - Power Mgmt

423236 York PS and Power Reliability

A20620 Combined Sewer Overflow - New Facilities & Improvements

423489 Carkeek Overflow Reduction

423587 Dechlorination Systems at CSO Facilities (Alki and Carkeek)

A20920 Water Reuse - New Facilities

423533 Normative Flow

A21100 Central Functions

423550 Freshwater Assessments Program

Projects to be Completed in 2007

A20020 South Treatment Plant - New Facilities & Improvement

423585 South Plant Odor Improvements

A20110 West Treatment Plant - Asset Mgmt

423461 WPTP Clarifier Painting/Coating Phase II

A20120 West Treatment Plant - New Facilities & Improvements

423584 West Point Odor Improvements

A20320 Local Treatment Facilities - New Facilities & Improvements

2007-017 Chinook Wetlands Enhancement

423460 VTP Vashon Facility Improvement

A20410 Conveyance Pipelines and Storage - Asset Mgmt

423363 Auburn Facilities Assessment

423602 Ballard Siphon Repair

4233578 Bellevue Interceptor Pipe Replacement

A20420 Conveyance Pipelines and Storage - New Facilities & Improvements

423121 Madsen Creek Erosion & Sewer Stabilization

423494 Fairwood Interceptor (Formerly Madsen Creek)

A20430 Conveyance Pipelines and Storage - Odor Control

423439 Fremont Siphon Odor Control

A20510 Conveyance Pump Station – New Facilities & Improvements

423518 Pacific Pump Station

A20530 Conveyance Pump Station - Odor Control

423590 Murray Avenue Pump Station Odor Control System Upgrade

423598 Swayolocken Force Main Odor Control Carbon Polisher

A21100 Central Functions

423311 WTD Financial System Replacement Project